

NM4 NETWORK HARDWARE UPGRADE WITH ADJUSTABLE DISPLAY ARM AND DATAGRIP

INSTALLATION PROCEDURE

CAUTION: Use proper ESD control during all removal and installation procedures.

1. Turn the System Power switch to STANDBY and remove AC power from the machine.

Disable all circuit breakers by pulling out each button with a knife or sharp object.

CAUTION: Do not plug or unplug remote display cable with power applied.

2. Disconnect the following items from the patient interface panel on the left side of the monitor box:

- Remote Display cable
- BP Cuff & BP Gauge lines
- Pulse Oximeter cable

3. Remove the disposable reservoir from its holder.

4. Remove the screws holding the monitor box cover, and carefully lift the cover from the monitor box.

5. Disconnect any external cables from the A, B, Printer, C and D ports on the underside of the serial interface assembly at the back of the machine.

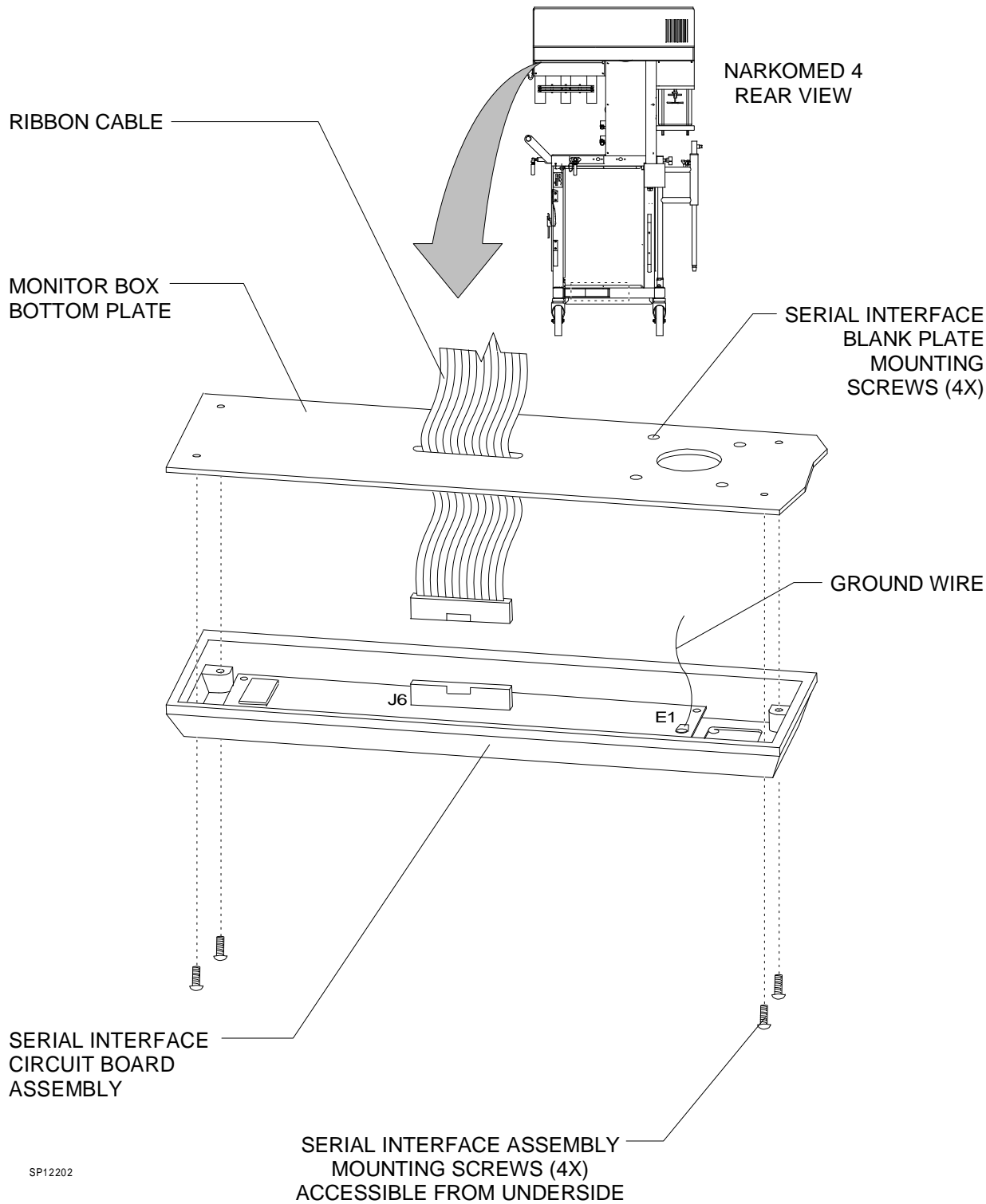
6. Loosen the four captive mounting screws holding the serial interface housing to the underside of the monitor box. See Figure 1.

7. Disconnect the ribbon cable from J6 on the serial interface circuit board, and disconnect the ground wire at terminal E1.

8. Remove both processor assemblies from the card cage. Mark the upper and lower assemblies so they can be reinstalled in their original position.

9. Remove the four screws securing the serial interface blank plate to the bottom plate of the monitor box. See Figure 1.

INSTALLATION PROCEDURE (continued)



SP12202

Figure 1: SERIAL INTERFACE ASSEMBLY AND NETWORK CONNECTOR LOCATION

INSTALLATION PROCEDURE (continued)

10. Assemble the network cable (P/N 4112414-002) to the serial interface network plate (P/N 4112344) in the direction shown in Figure 2. Press the network connector into the hole in the plate until it locks into position.
11. Route the network cable up through the hole in the monitor box where the blank plate was removed. Route the cable under the backplane assembly, and down into the ventilator box through the opening next to the SpO₂ module.

NOTE:

It will be necessary to loosen the four captive screws securing the card cage to the monitor box. This will allow the card cage to be lifted slightly to permit the network cable plug to pass under the backplane assembly at the front of the card cage.

12. Attach the network interface plate and cable to the underside of the monitor box using the hardware that was previously removed from the blank plate. Orient the network plate with the notch in the connector facing to the left as viewed from the rear of the machine.

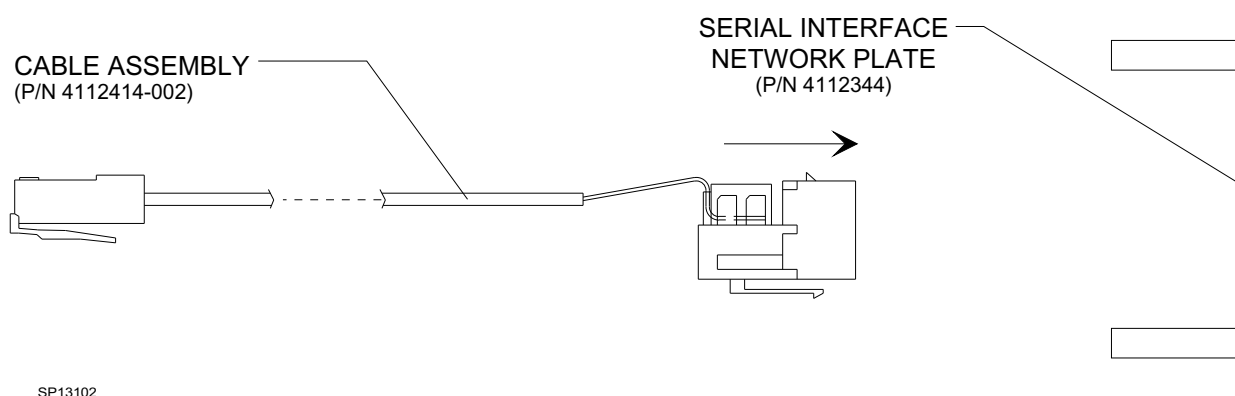


Figure 2: SERIAL INTERFACE NETWORK PLATE AND CABLE ASSEMBLY

INSTALLATION PROCEDURE (continued)

- | | |
|---|--|
| <p>13. Reinstall the serial interface assembly as follows: reconnect the ground wire to terminal E1 and the ribbon cable to J6 on the circuit board, and secure the assembly to the underside of the monitor box with its four captive mounting screws.</p> <p>14. Remove the four backplane mounting screws at connectors J35 and J38. See Figure 3.</p> <p>15. Replace these screws with four 3-48 x 5/16 in. pan head screws (P/N HW02031).</p> <p>16. On the front side of the backplane support, install four 3-48 x 5/16 in. hex standoffs (P/N 4110589-020) and #3 lockwashers (P/N HW68005) as shown in Figure 3.</p> | <p>17. Install the NM4 Datagrip PCB assembly (P/N 4112027) onto the standoffs with four 3-48 x 1/4 in. pan head screws (P/N HW02026) and #3 lockwashers (P/N HW67014). Ensure that the board is oriented with J1 at the top.</p> <p>18. Install the ten-cond. ribbon cable (P/N 4112579-005) from J1 on the NM4 Datagrip board to J31 on the backplane. See Figure 3.</p> <p>19. Carefully reinstall the two processor assemblies in their correct positions in the card cage.</p> |
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INSTALLATION PROCEDURE (continued)

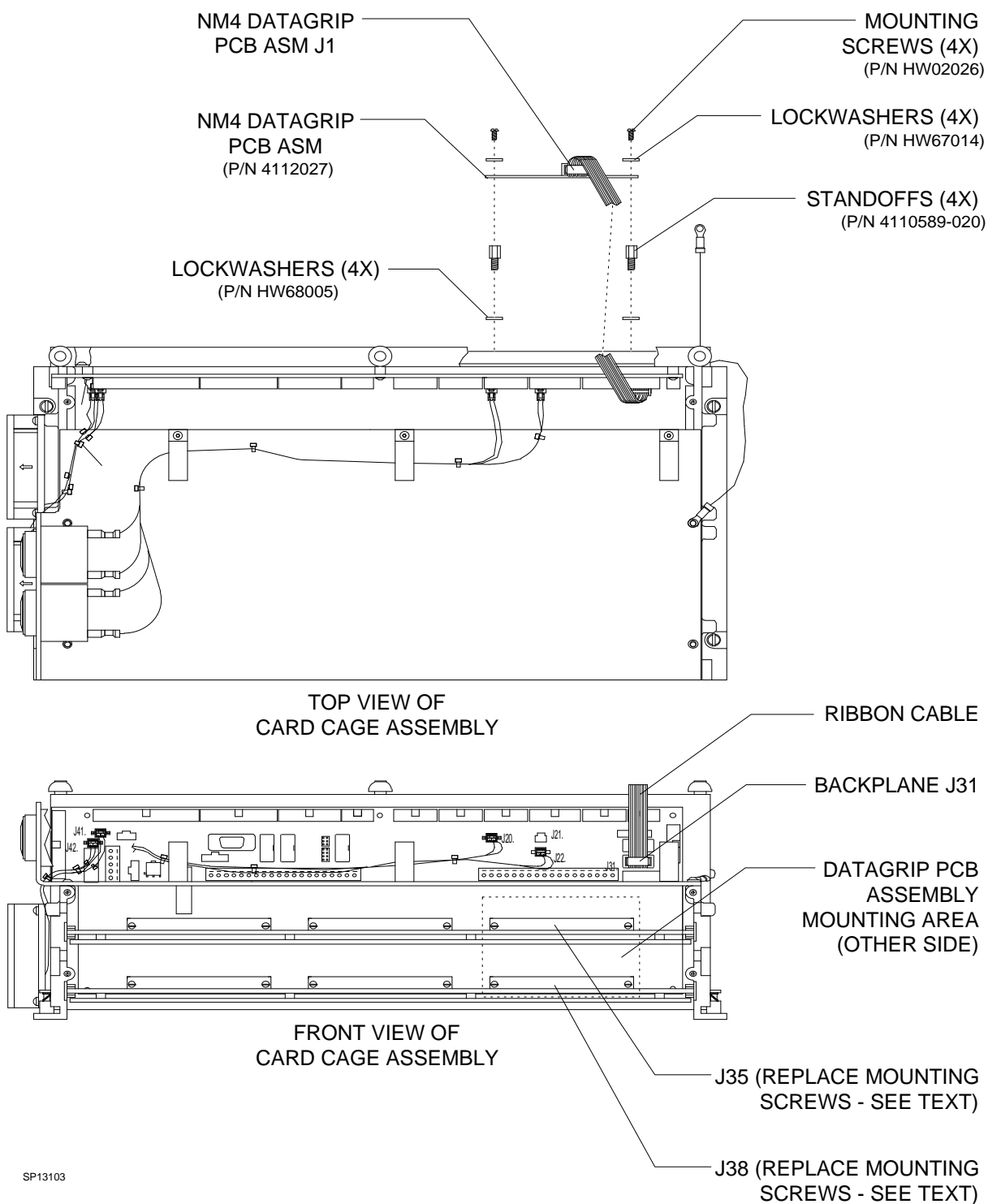


Figure 3: NM4 DATAGRIP PCB ASSEMBLY INSTALLATION

INSTALLATION PROCEDURE (continued)

20. Remove the blank insert from the top position of the patient interface panel at the left side of the monitor chassis.
21. Install the Datagrip connector panel and cable assembly in the top position using the hardware removed in the previous step.
22. Connect the cable from the Datagrip interface panel to J2 on the NM4 Datagrip PCB assembly as shown in Figure 4.

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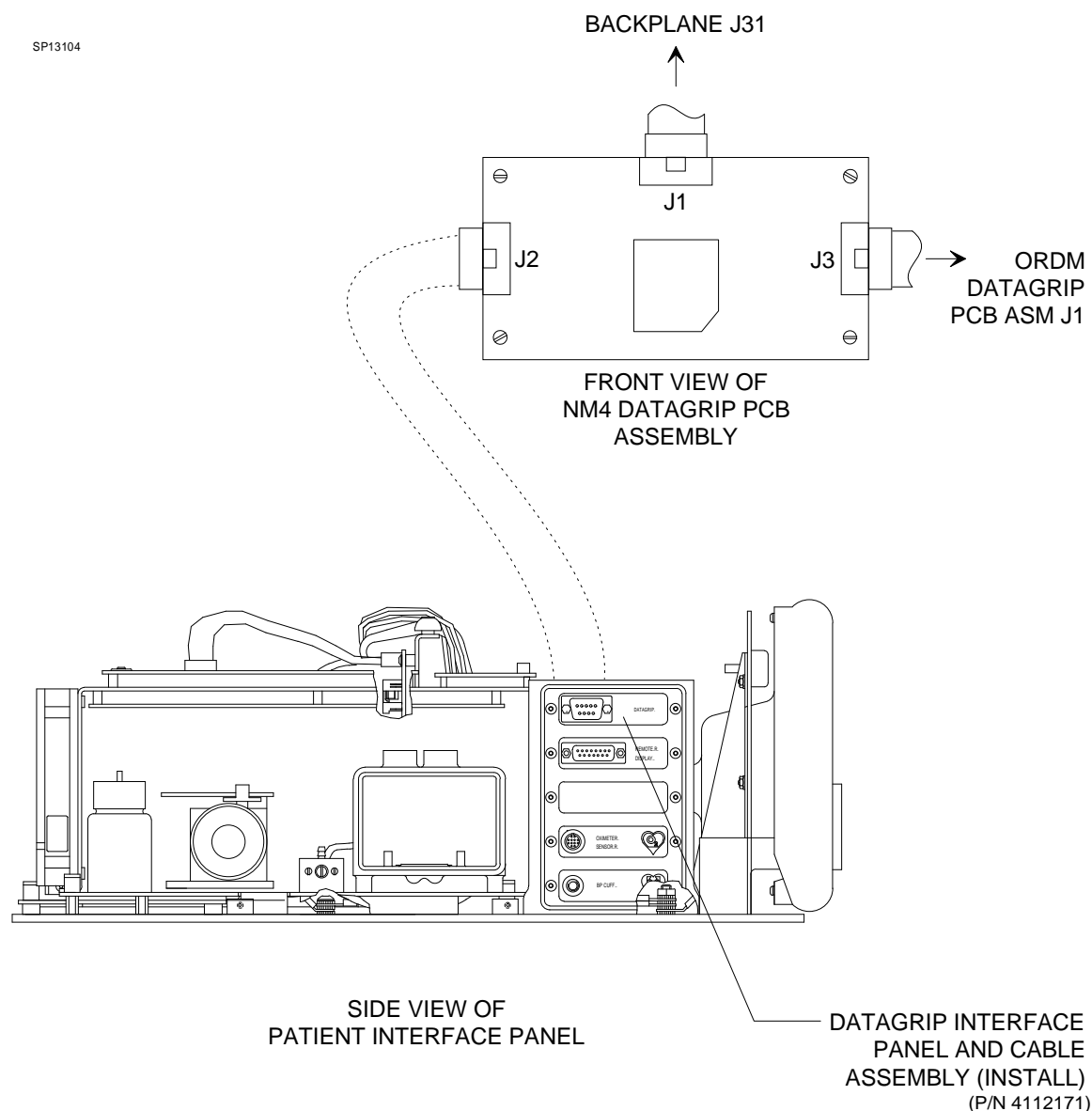


Figure 4: DATAGRIP INTERFACE PANEL AND CONNECTION

INSTALLATION PROCEDURE (continued)

23. Disconnect the ORDM cables from J3, J13 and J14 on the backplane circuit board, and separate the floating ORDM power and keyboard connectors.
24. Remove any disk from the ORDM disk drive.
25. Remove the four screws holding the right front panel of the ventilator box, and remove the panel.

On later machines with an AV-2 ventilator, remove the two screws at the right end of the panel. Pull the right side of the panel outward, slide it to the right until the left side of the panel is clear of its receptacle, and remove the panel.
26. Loosen the two captive screws holding the ORDM sub-assembly to the floor of the ventilator box. Carefully slide the sub-assembly forward while feeding its cables down into the ventilator box, and remove the sub-assembly from the ventilator box.
27. Examine the ORDM compartment in the ventilator box and verify that there is no comb style cable conduit in the rear of the ventilator box. Remove any comb style conduit before reinstalling the ORDM sub-assembly.
28. If the ORDM cables are not connected to the ORDM sub-assembly, connect the cables as shown in Figure 5 at this time. Wrap all of the cables except the network cable in the cable sheath (P/N 4110151) provided in the parts kit.
29. Slide the ORDM sub-assembly into the ventilator box, and feed the cables up into the monitor box through the opening near the SpO₂ module.
30. Connect the network cable to J9 on the system interface board at the rear of the ORDM sub-assembly. See Figure 5.
31. Position the ORDM sub-assembly in the ventilator box and tighten its two captive mounting screws.
32. Join the ORDM power wire harness to the ORDM power connector. Route the power wire harness through the cable clamps as shown in Figure 5.
33. Join the keyboard cable to the cable from J5 on the System Interface Board. Route the cables through the clamps on the card cage assembly as shown in Figure 5.

INSTALLATION PROCEDURE (continued)

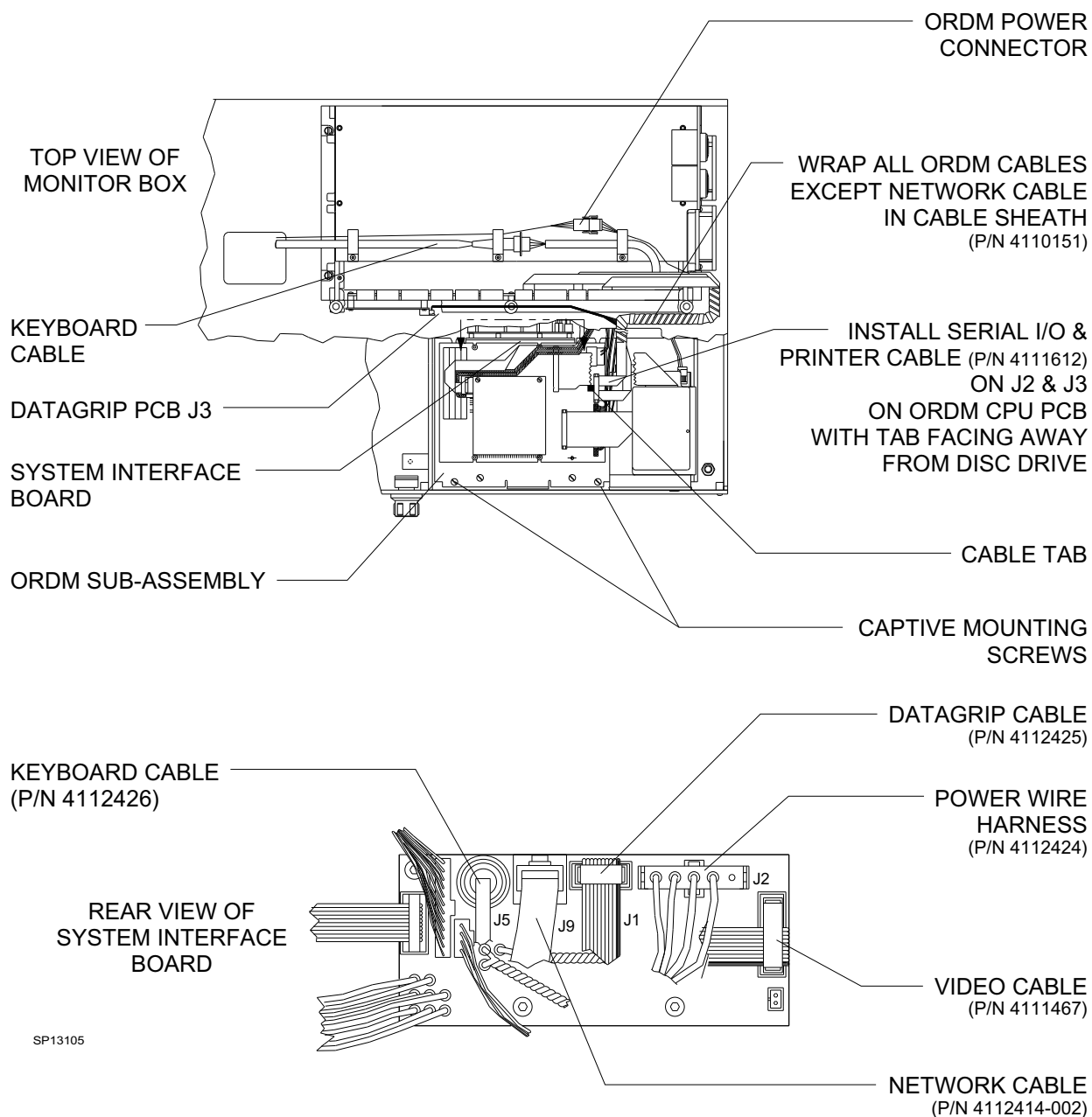


Figure 5: ORDM SUB-ASSEMBLY INSTALLATION

INSTALLATION PROCEDURE (continued)

34. Connect the ORDM cables (labeled J3 and J14) to J3 and J14 on the backplane PCB. See Figure 6.
35. If the machine is a later model with a new style backplane (P/N 4111881) as shown in the upper section of Figure 6, connect the ORDM cable (DB9) directly to J13 on the backplane.

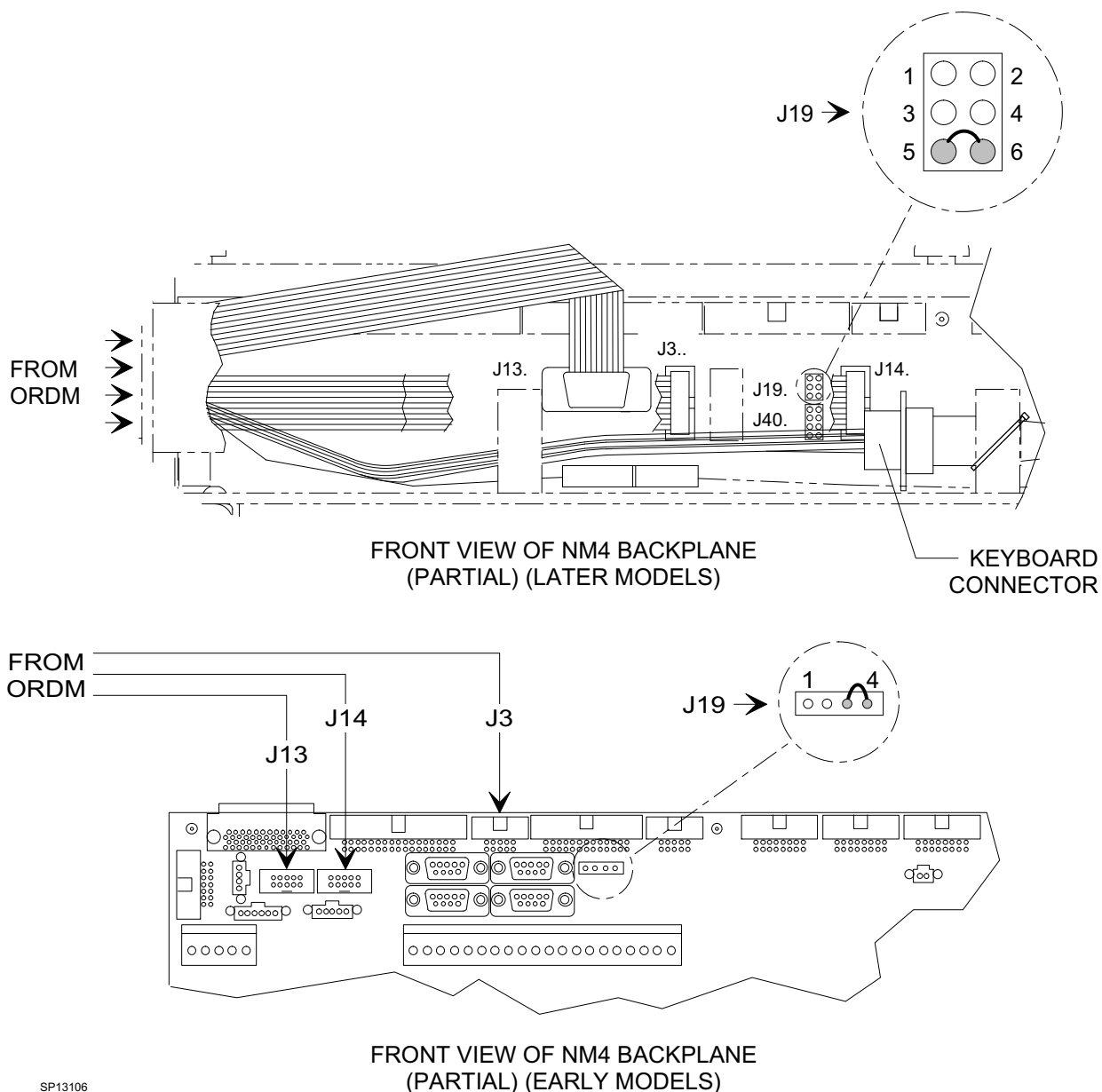


Figure 6: ORDM CABLE CONNECTIONS TO BACKPLANE

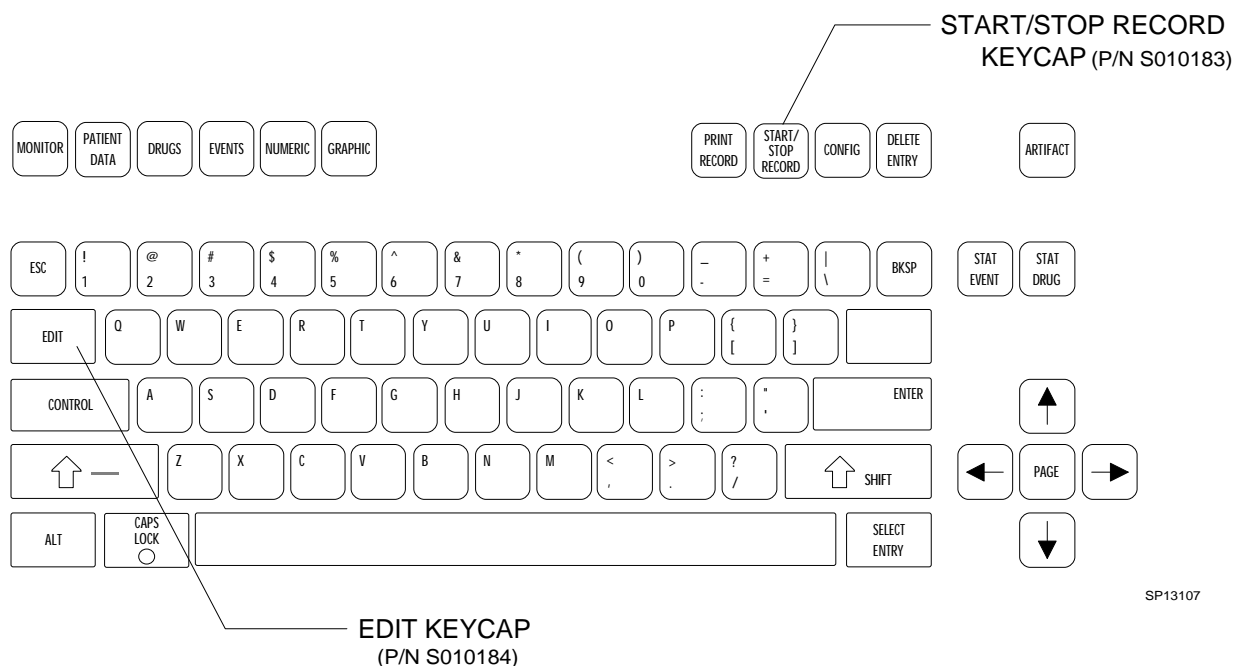
INSTALLATION PROCEDURE (continued)

- 35 (cont'd) If the machine is an earlier model with the older style backplane assembly (P/N 4110699) as shown in the lower section of Figure 6, connect the ORDM cable (DB9) to J13 reusing the original printer adapter cable. Secure this connection with two tie straps (P/N 4106068) as shown in the illustration.
36. Verify that the jumper arrangement on J19 is correct as shown in Figure 6: JP19-5 to JP19-6 on the new style backplane (P/N 4111881), or JP19-3 to JP19-4 on the older style backplane (P/N 4110699).

NOTE: Do not remove any existing jumpers from the other pins as this could affect other machine functions.

37. Connect the ORDM cable (labeled DG) to J3 on the Datagrip PCB located on the front of the chassis. (This cable originates at J1 on the system interface board on the back of the ORDM sub-assembly. Ref. Figure 5.)
38. Reinstall the ventilator box right front panel with the screws that were previously removed.
39. Pull out the keyboard and verify that the EDIT and START/STOP RECORD keycaps are installed as shown in Figure 7.

If either of these keycaps are not present, remove the keyboard cover and carefully lift off the existing keycap(s). Press the new keycap(s) into place. Clean the keyboard faceplate and install a new keyboard cover (P/N 4111314).



SP13107

Figure 7: KEYBOARD LAYOUT WITH CORRECT KEYCAPS

INSTALLATION PROCEDURE (continued)

40. Remove the screws securing the cable clamps to the underside of the existing boom arm. Remove the cables from the clamps.

If the machine is equipped with a manual sphygmomanometer, disconnect the gauge line from the interface panel. Unscrew the threaded mounting ring from the gauge mount (see Figure 8) and set the gauge aside.

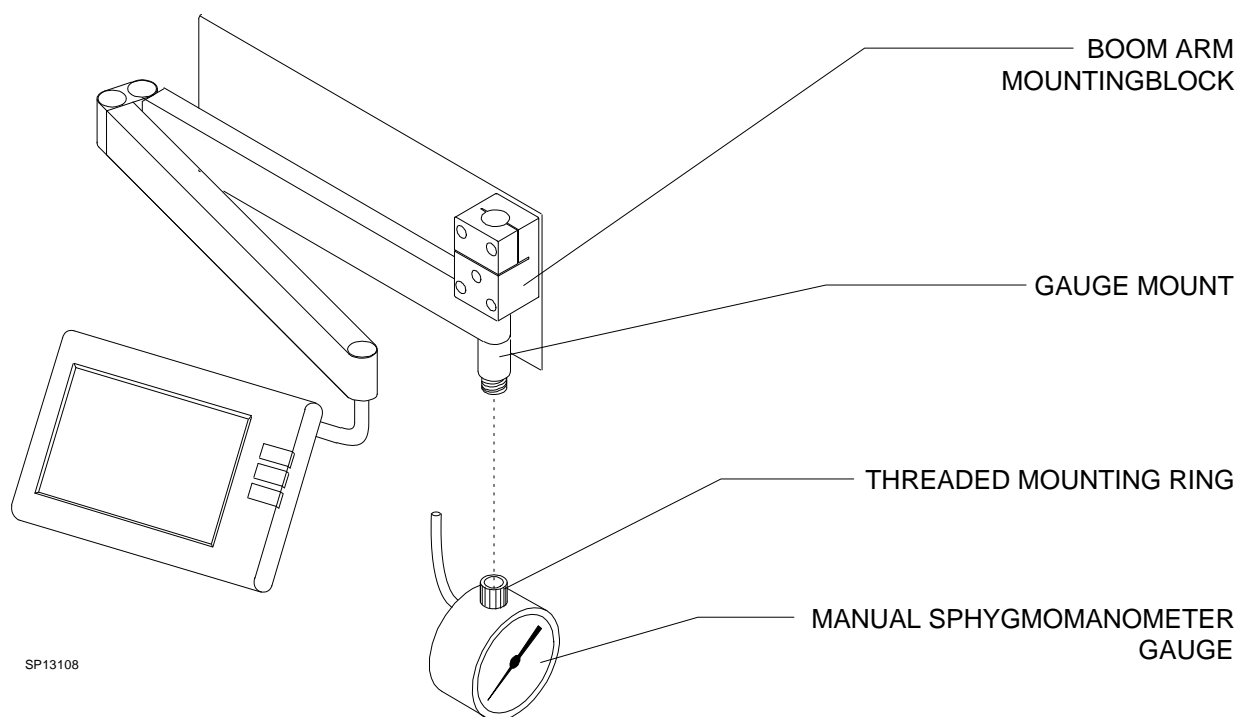


Figure 8: SPHYGMOMANOMETER GAUGE REMOVAL

INSTALLATION PROCEDURE (continued)

41. Loosen the clamp screw in the boom arm mounting block, and remove the patient cable (upper) boom arm. See Figure 9.

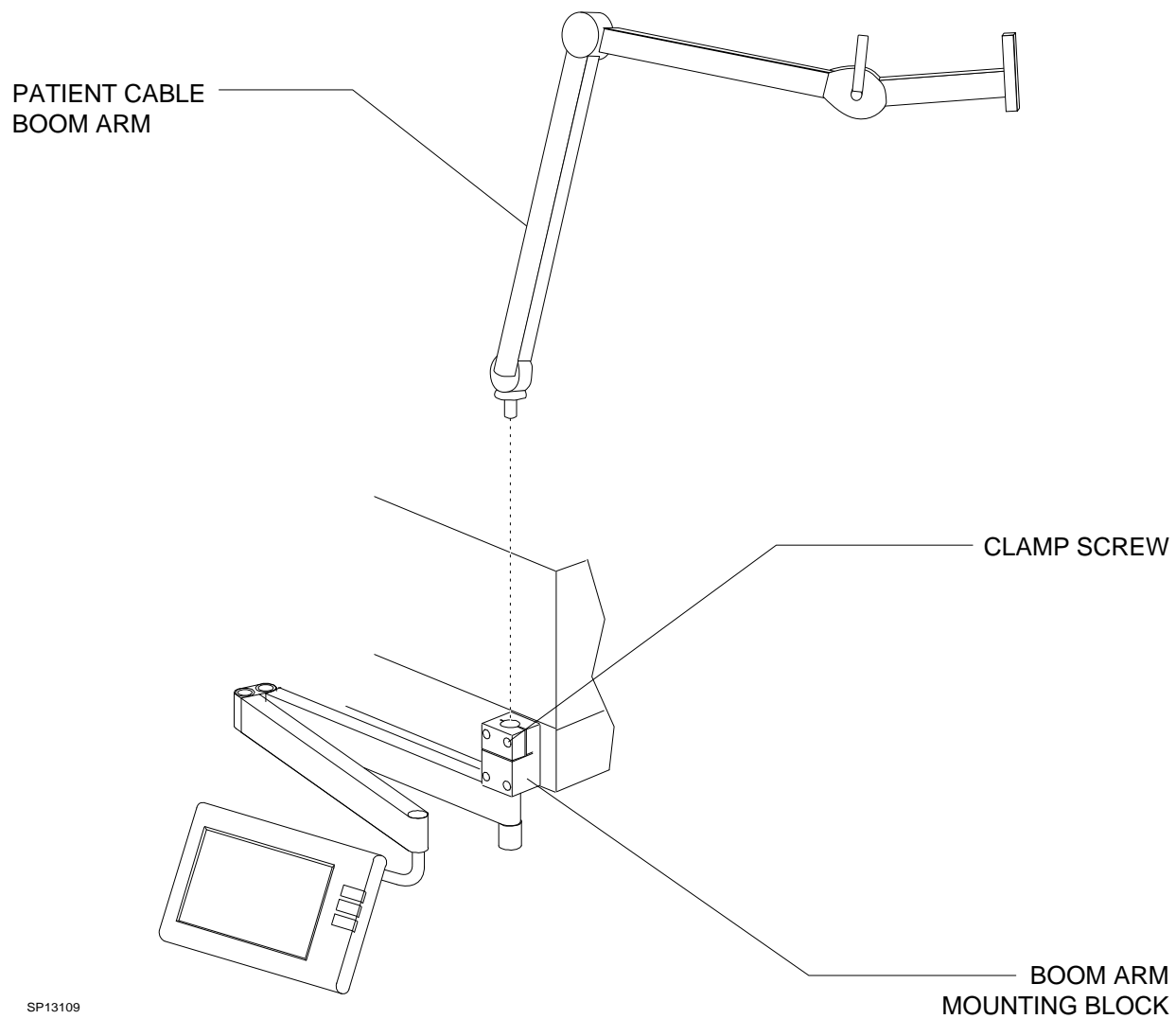


Figure 9: UPPER BOOM ARM REMOVAL

INSTALLATION PROCEDURE (continued)

42. Remove the plastic cap at the outboard end of the boom arm to expose the remote display mounting screw. See Figure 10.
43. While holding the remote display assembly, loosen the mounting screw until the assembly separates from the boom arm. At this point the display assembly should be completely separated from the boom arm.
44. Remove the boom arm assembly from the machine by removing the four boom arm mounting block screws.
45. If the machine is equipped with a support plate (see Figure 10) remove the support plate from the machine.

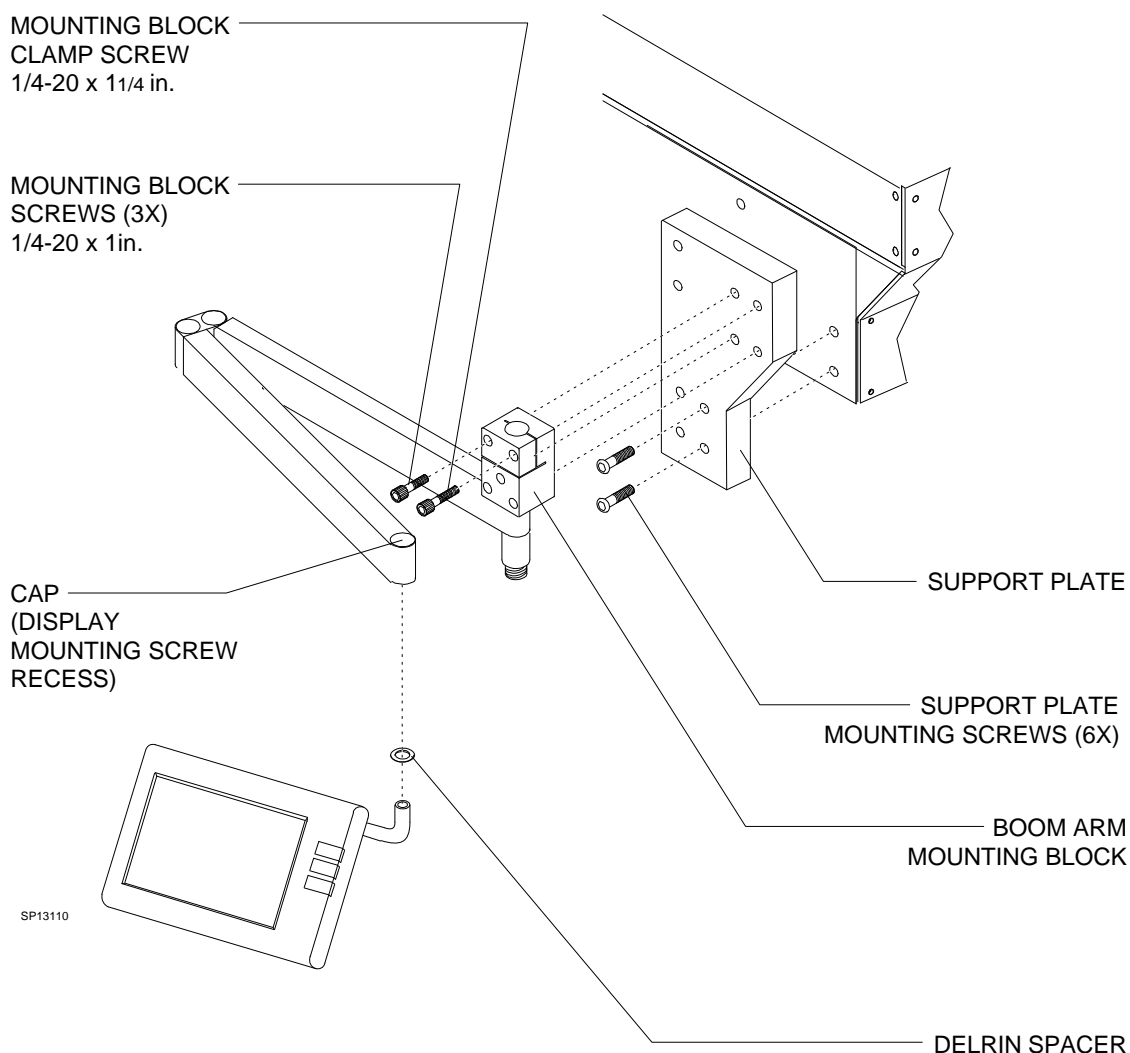


Figure 10: DISPLAY AND EXISTING BOOM ARM REMOVAL

INSTALLATION PROCEDURE (continued)

46. Install the new support/adapter plate (P/N 4112523) to the new adjustable display arm using two $\frac{9}{16}$ -24 x 1 in. flat head socket screws (P/N HW03044).

NOTE: Steps 48 thru 52 are performed using the hardware provided in the packet supplied with the adjustable remote arm. Refer to Figure 11 for these steps.

- 46A. If the joint assembly is not pre-assembled to the display arm, insert the joint assembly into the arm and secure it with three 10-32 x $\frac{9}{16}$ in. button head socket screws (P/N HW09005). See assembly detail in Figure 11.

47. Install the patient IV line plastic looms using a 6-32 x $\frac{9}{16}$ in. button head socket screw (P/N HW09000) to secure each loom. Apply a small amount of Loctite #222 (purple) to the threads of each screw before installation. (An additional mounting screw will be installed through the bottom of each loom when the Datagrip and display cables are installed.)

If the patient IV line wire loom block was pre-assembled to the arm, skip to Step 50.

48. Place the $\frac{1}{4}$ in. flat washer in the recess in the wire loom block.

49. Insert the block into the arm and secure it with two 10-32 x $\frac{1}{2}$ in. button head socket screws through the bottom of the arm. Apply a small amount of Loctite #222 (purple) to the threads of each screw before installation.

50. Insert the patient IV line wire loom up into the display arm elbow. Turn the wire loom as needed to align its tapped hole with the access hole in the end of the block.

51. Apply a small amount of Loctite #222 (purple) to the threads of a 6-32 x $\frac{1}{2}$ in. flat point set screw, and thread the screw into the hole in the wire loom until the loom can be rotated 360° on its axis.

52. If not already installed, thread the 10-32 x 1 in. socket head cap screw into the wire loom block and tighten the screw until the wire loom has the desired tension.

INSTALLATION PROCEDURE (continued)

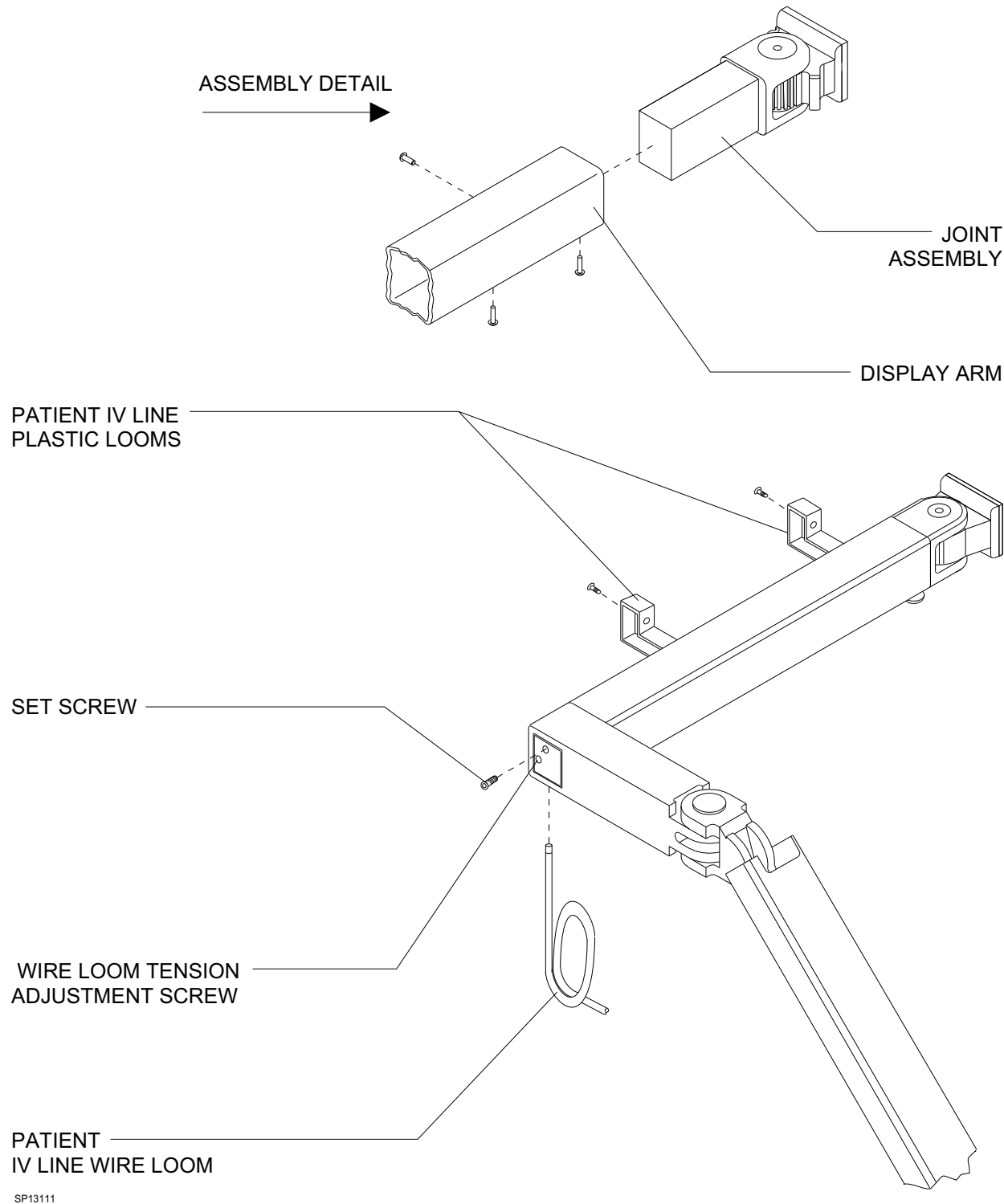


Figure 11: ASSEMBLING THE DISPLAY ARM HARDWARE

INSTALLATION PROCEDURE (continued)

53. Position the adjustable display arm at the left side of the machine, and install six (some machines may use four) ¼-20 x 7/8 in. btn hd socket screws and lockwashers as shown in Figure 12.

NOTE:

If the machine has a manual sphygmomanometer, use a ¼-20 x 2 in. btn hd socket screw (P/N HW09064) and lock washer (P/N HW65010) through a later style gauge mount (P/N 4112521) at the lower front corner of the support plate.

Attach the mounting adapter (P/N 4109347) to the later style gauge mount using a ¼-20 x ¾ in socket head cap screw (P/N HW01036).

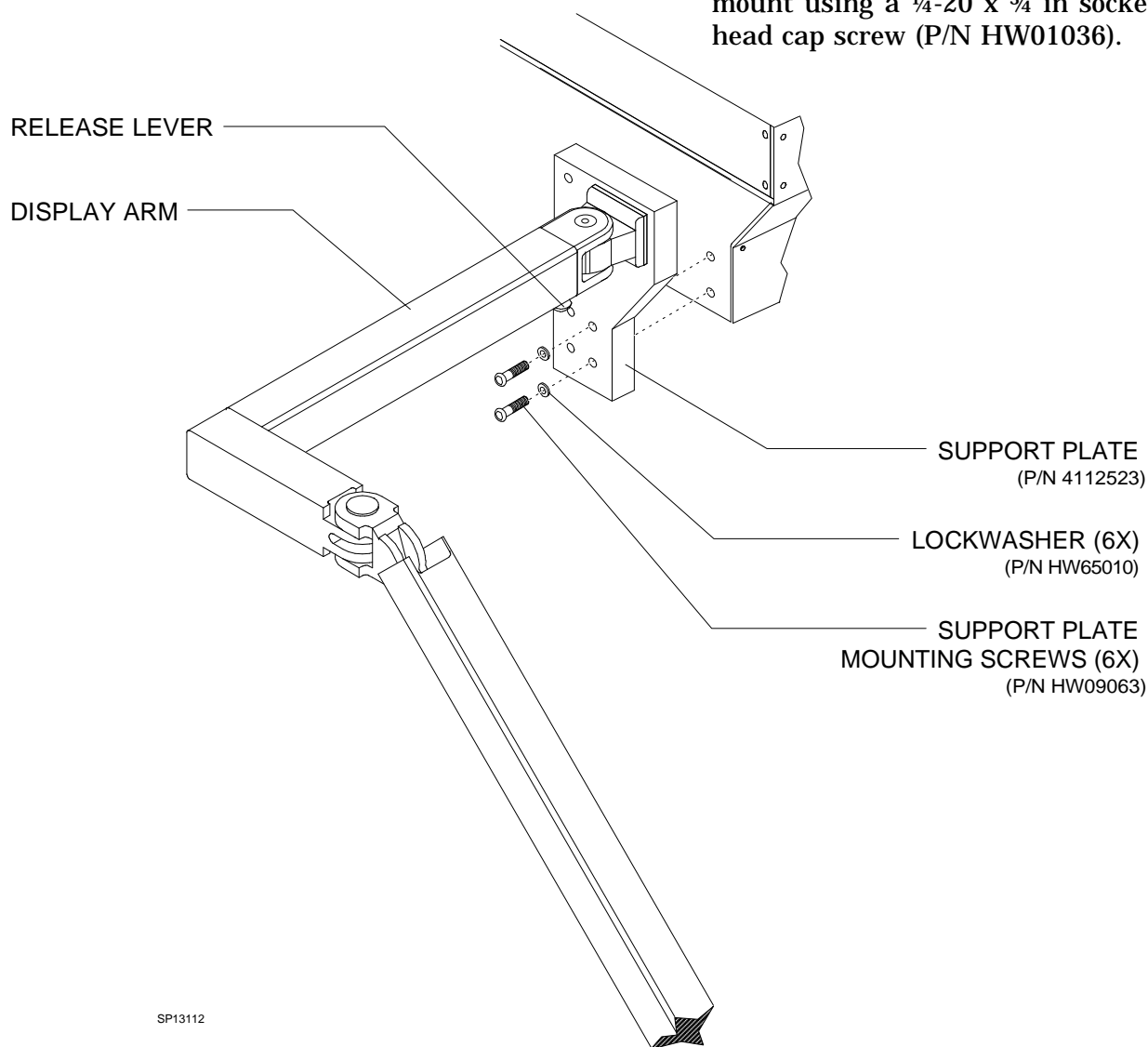


Figure 12: DISPLAY ARM INSTALLATION

INSTALLATION PROCEDURE (continued)

54. Remove the six screws holding the rear cover of the remote display and separate the rear cover from the remote display. Use caution when separating the cover so that cables are not pulled from the display.
55. Loosen the remote display clamp screws. See Figure 13. Remove the outer retaining ring from the remote display mounting rod, and withdraw the rod approx. 3 in. until the end of the rod clears the first clamp. Remove the inner retaining ring and fully withdraw the display mounting rod.
56. Examine the mounting rod hole in the remote display cover. If the hole does not have a notch as shown in Figure 13, carefully cut or file a $\frac{1}{8}$ in. wide notch in the cover that will clear the stop pins on the new Datagrip display mounting rod.
57. Replace any cracked display mounting clamps (P/N 4112685-001) at this time with the spare clamps provided in the kit.
58. Reinstall the rear cover on the remote display with the screws that were previously removed. (Install the two shorter screws at the bottom.)

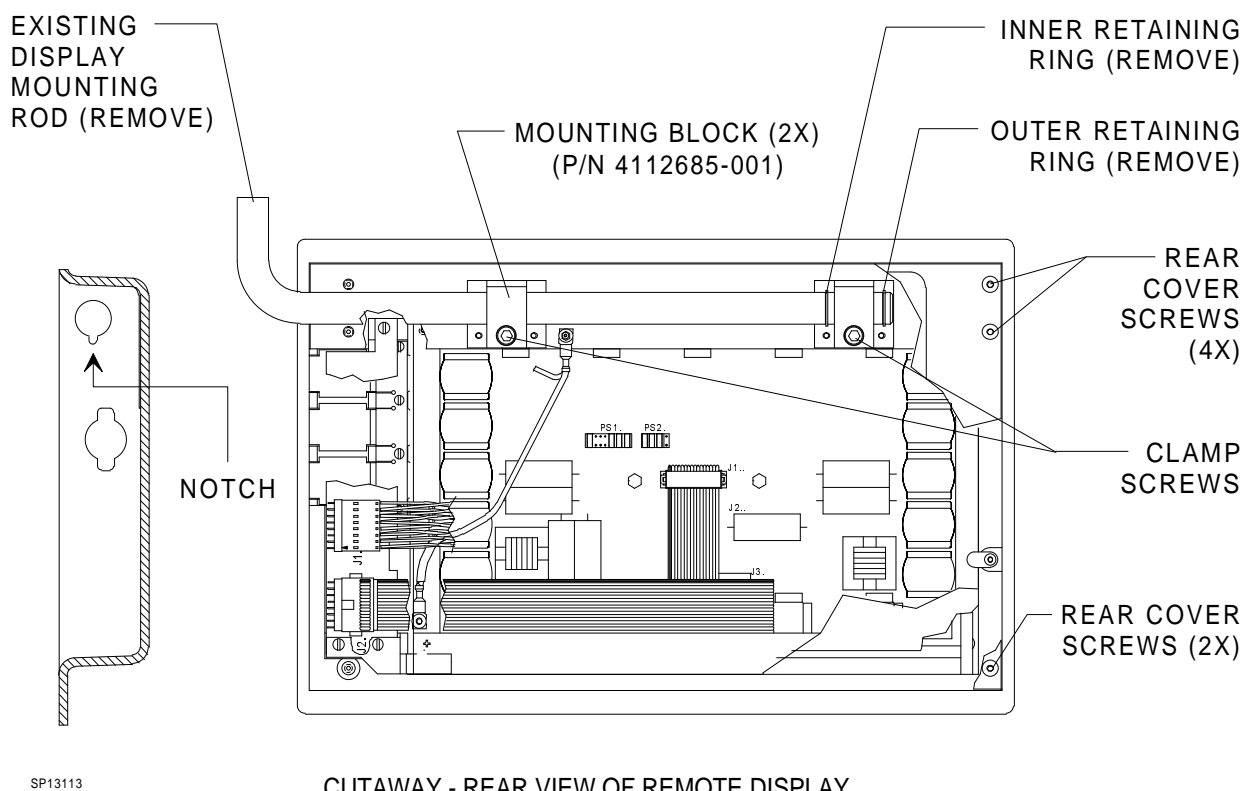


Figure 13: REMOTE DISPLAY DETAILS

INSTALLATION PROCEDURE (continued)

59. Slide the remote display onto the Datagrip display mounting rod. Orient the display with its face toward the floor so that the stop

pins on the rod will pass through the slots in the mounting clamps, and continue sliding the display into position.

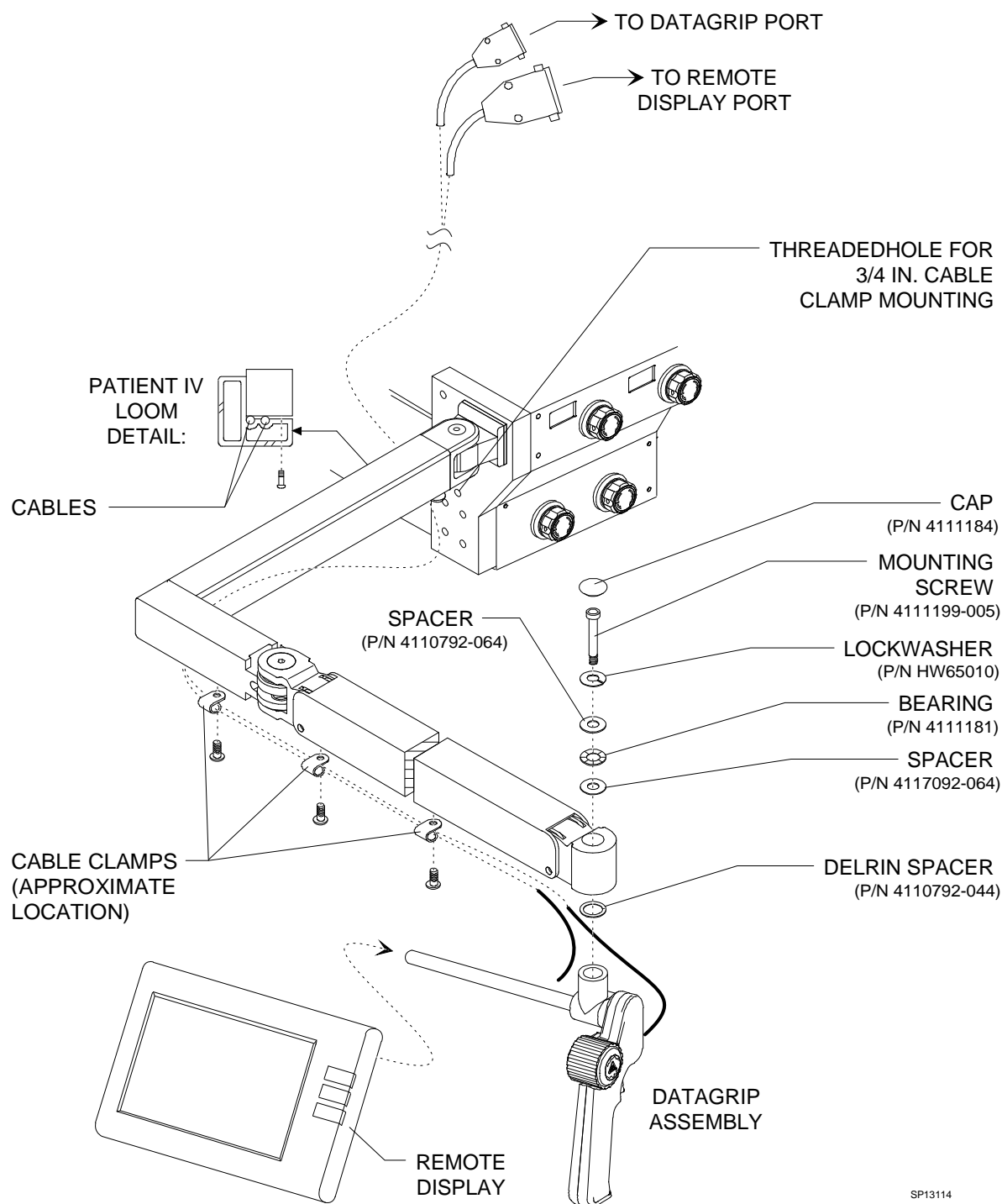


Figure 14: REMOTE DISPLAY/DATAGRIP INSTALLATION

INSTALLATION PROCEDURE (continued)

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| <p>60. Install the Datagrip assembly (P/N 4111907) at the outboard end of the display arm. See Figure 14. Be sure the delrin spacer is in place between the assembly and the display arm. Tighten the mounting screw to a torque of 4 foot pounds. Reinstall the plastic cap at the end of the arm.</p> <p>61. Tighten the mounting clamps (accessible through clearance holes in the rear cover) until the remote display has the desired amount of friction on the mounting rod.</p> <p>62. Attach the Datagrip and remote display cables to the underside of the arm using three $\frac{3}{8}$ in. plastic cable clamps and three 6-32 x $\frac{3}{8}$ in. button head screws (P/N HW09000) as shown in Figure 14. (The clamps are included in the hardware kit supplied with the adjustable arm.)</p> <p>Slide the cables under the patient IV line plastic looms (see detail in Figure 14) and install a 6-32 x $\frac{3}{8}$ in. button head socket screw through each loom into the display arm.</p> | <p>63. Attach the cables to the adapter plate using a $\frac{3}{4}$ in. plastic cable clamp (P/N 4106649) and 6-32 x $\frac{3}{8}$ in. button head socket screw (P/N HW09000).</p> <p>64. Temporarily connect the Datagrip and remote display cables to their interface panels on the monitor box.</p> <p>65. Pull the release lever on the display arm and verify that the arm has full range of motion with no binding caused by the cables. Position the cables in their clamps as needed, and tighten the clamp screws. Coil excess cable in the bottom loops of the plastic IV looms.</p> <p>Disconnect the Datagrip and remote display cables from their interface panels.</p> <p>66. If the machine is equipped with a manual sphygmomanometer, screw the threaded mounting ring of the gauge onto the gauge mount.</p> |
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INSTALLATION PROCEDURE (continued)

67. Loosen the friction adjustment screw on the underside of the display arm (no more than one turn). (It may be necessary to raise or lower the arm to align the screw with the access hole.) See Figure 15.

68. Raise and release the arm, and verify that it returns to an approximately horizontal position.

Lower and release the arm, and verify that it returns to an approximately horizontal position.

Contact the NAD Service Department if the display arm fails to return to a near-horizontal position.

69. Slowly re-tighten the friction adjustment screw until the arm stays in position when raised or lowered. (Do not over-tighten the screw as this will cause the arm to loose tension in the raised position.)

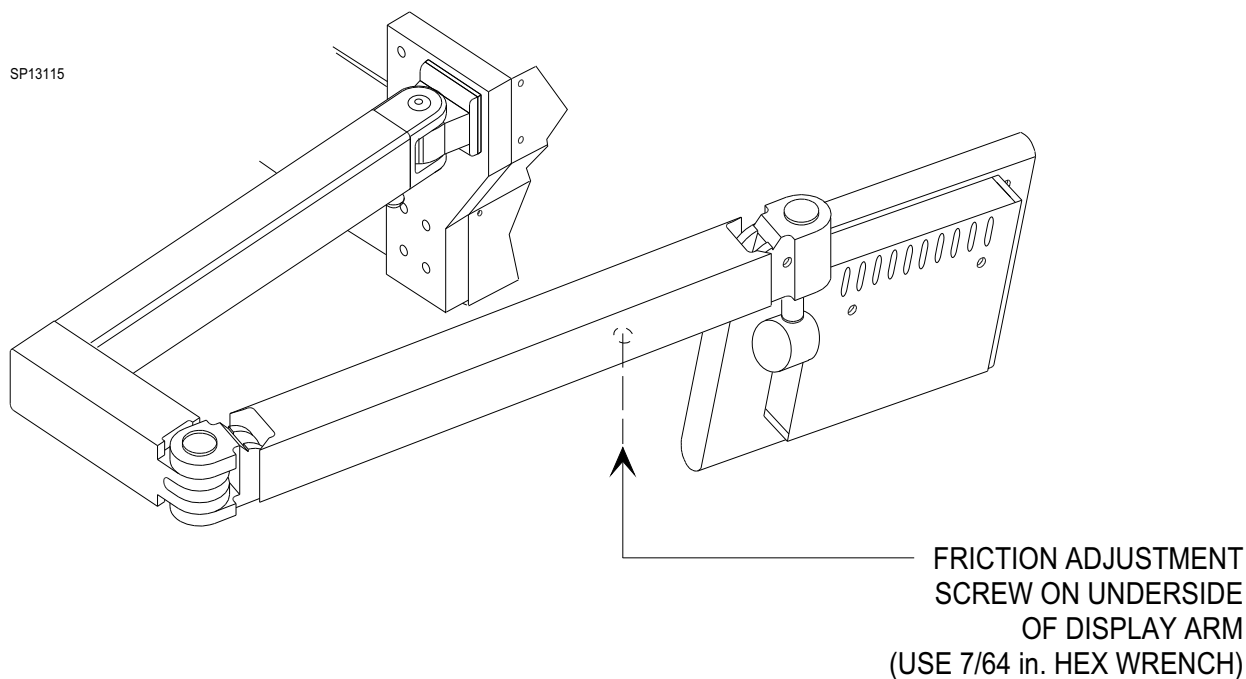


Figure 15: DISPLAY ARM ADJUSTMENT

INSTALLATION PROCEDURE (continued)

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| <p>70. Reinstall the monitor box cover. Connect the Datagrip and display cables to their interface panels, and reconnect the items that were previously removed from the patient interface panel.</p> <p>71. Reinstall the disposable reservoir in its holder.</p> | <p>72. Reattach any external data cables that were previously removed from the serial interface at the rear of the machine.</p> <p>73. Plug the AC power cord into a live AC receptacle and enable all circuit breakers.</p> |
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SOFTWARE LOADING AND TEST

NM4 Software Loading:

NOTE: If the Narkomed 4 has software version 1.2 or later, proceed to Step 13.

- | | |
|---|---|
| <p>1. Call the NAD Technical Service Department and obtain the following information for downloading NARKOMED 4 Software Release 1.2:</p> <ul style="list-style-type: none"> •System configuration •Communications protocol •CRC value <p>2. Download the software to the hard disk on the PC.</p> <p>3. Set the System Power switch on the NARKOMED 4 to STANDBY, and the power switch on the PC to OFF.</p> <p>4. Connect the appropriate interface cable (9-pin or 25-pin) to COM 1 on the PC, and connect the other end of the cable to the NM4 serial interface Port A as shown in Figure 16.</p> | <p>5. Press and hold the MONITOR SETUP and TREND keys, and turn the System Power switch to ON. Release the MONITOR SETUP and TREND keys when the load mode screen shown in Figure 17 appears.</p> <p>6. Power up the PC and wait for the DOS prompt to appear on the screen.</p> <p>7. Set the PC to read the drive holding the software. For example: if the software was downloaded to drive C, type C: and press ENTER.</p> <p>8. Type LOAD_NM4 and press ENTER. Note that the character between LOAD and NM4 is an underline.</p> <p>9. The PC program will print the version number and ask for verification. Press ENTER to proceed. The PC screen is shown in Figure 18.</p> |
|---|---|

SOFTWARE LOADING AND TEST (continued)

10. Verify that the CRC value shown on the PC screen matches the one obtained from the NAD Technical Service Department. After several minutes have elapsed, the NM4 will auto re-boot and will enter a power-up sequence with the new software version number displayed.
11. After the NM4 re-boots, press the ESC key on the PC.
12. Set the System Power switch on the NM4 to STANDBY, and the power switch on the PC to OFF. Disconnect the interface cable.

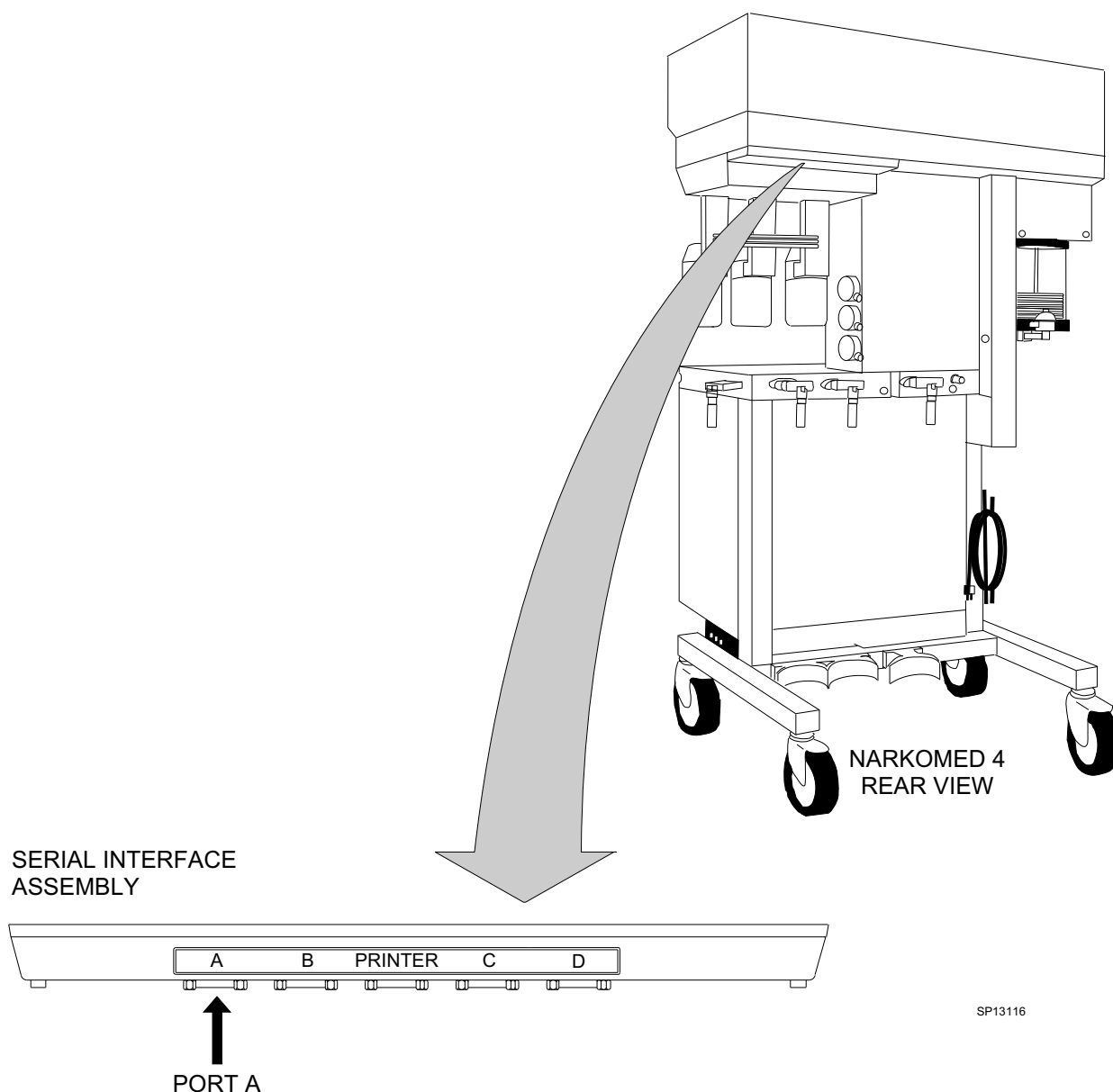


Figure 16: NARKOMED 4 EXTERNAL SOFTWARE LOAD INTERFACE CONNECTION

SOFTWARE LOADING AND TEST (continued)

FIRMWARE TESTS

BOOT PROGRAM

PASS

NAD NM4 PROCESSOR BOOT ROM
(C) COPYRIGHT 1988-1990, NAD INC.
VERSION: 1.2

NM4 SOFTWARE LOADER

MAIN

WAITING FOR INPUT

FIGURE 17: NARKOMED 4 LOAD MODE SCREEN

```
A:\>load_nm4

A:\>ECHO OFF

    Ready to loadNM4 Software at
    **** NM4 Software - Version 1.11 ****

    Enter CTRL C to ABORT
    Strike a key when ready . . .

    NM4 Software Image Transfer Program (V1.0)
    * Copyright (c) 1990 by NAD, Inc. *
port : COM1      file : NM4.IMG      baud rate : 38400
READY TO TRANSMIT Software Version 1.11      SIZE=1048320 bytes CRC=CF39
Press ESC to exit

xxxxxxx bytes sent
```

FIGURE 18: SOFTWARE LOAD PC SCREEN

SOFTWARE LOADING AND TEST (continued)
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NM4 Test:

- | | |
|---|--|
| <p>13. Turn the System Power switch to ON.</p> <p>14. Following the power-up diagnostics, verify that the Datagrip softkeys appear on the remote display. If a stacked gas bar appears, check the cable connection from the backplane to the NM4 Datagrip board. Replace the cable or NM4 Datagrip board if necessary.</p> <p>15. Press the BACKUP hard key. Verify that the Datagrip softkeys appear on the remote display when the backup processor is selected. If a stacked gas bar appears, swap the processors.</p> | <p>16. Rotate the Datagrip selector wheel and verify that the cursor moves correctly on the remote display. Pull the Datagrip trigger and verify that the selected softkey highlights.</p> <p>If the Datagrip does not function properly, check the external connection to the interface panel, and the internal connection from the interface panel to the NM4 Datagrip board.</p> <p>NOTE: If the image on the remote display is not stable following the Datagrip installation, contact the NAD Technical Service Department.</p> |
|---|--|

SOFTWARE LOADING AND TEST (continued)

17. On the ORDM keyboard, press and hold the ALT key, and press the V key.

The window shown in Figure 19 will appear at the center of the remote display for approximately three seconds. The current software version number shown on the remote display should agree with that marked on the program disk or its accompanying documentation.

18. Verify function of Datagrip in ORDM screens by pulling the trigger and observing the menu screen. Use the thumbwheel to move the cursor in the menu screen.
19. Ensure that an updated copy of the Operator's Manual (P/N S4111402) accompanies the machine.
20. Perform a complete PMS procedure on the machine.

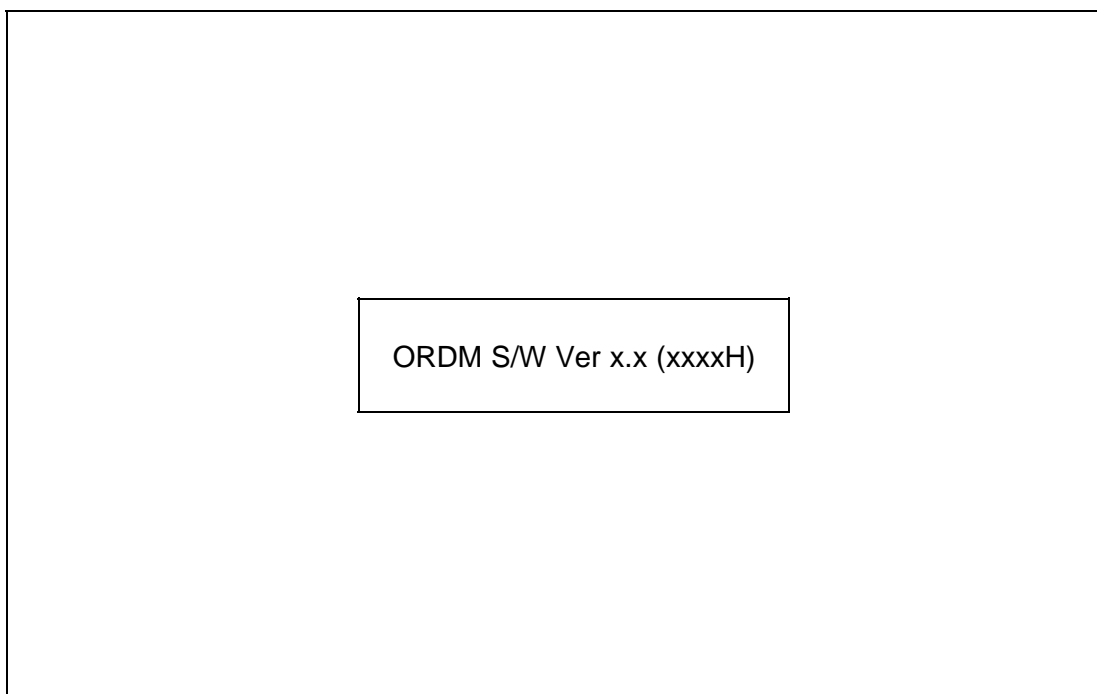


Figure 19: SOFTWARE VERSION WINDOW



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AMERICAN
DRÄGER

Quality Service for Life®

Technical Service Department
3122 Commerce Drive
Telford, PA 18969
(215) 721-5402
(800) 543-5047
(215) 723-5935 Fax

Part Number: SP00131
Rev: D
Date: April 29, 1996
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